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MISSOURI DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF ENVIRONMENTAL QUALITY  
LABORATORY SERVICES PROGRAM

Report of Sampling Investigation

Litton Industries  
Springfield, Missouri  
January 27, 1988

INTRODUCTION

Information received by the Missouri Department of Natural Resources indicates that liquid plating waste was discharged onto property owned by Litton Industries. Litton manufactures printed circuit boards, the process of which includes plating with copper pyrophosphate, nickel, rhodium, gold, and tin. Plating waste has been disposed of by irrigation on Litton property, discharged into a sinkhole on Litton property, and by discharging into ponds which overflowed into terraced leach fields on Litton property. The ponds have since been cleaned out and dozed in, and the sludges from the ponds were hauled to an approved waste disposal site. All of these disposal processes took place in the same general area of property owned by Litton, at different time intervals. The waste is reported to have contained toxic metals and possibly organic solvents, and may pose a threat to the shallow groundwater. At the request of the Waste Management Program, a sampling investigation was conducted by Ken Teeter of the Laboratory Services Program, Environmental Emergency Response Unit, accompanied by Mr. Chuck Kroeger, of the Springfield Regional Office.

METHODS

The former leach field used by Litton Industries was divided into two sections: the upper leach field area, and the lower leach field area. A site map indicating the upper and lower leach fields is attached as Appendix A. One composite soil sample of five aliquots was collected from the upper leach field area, and one composite soil sample of six aliquots was collected from the lower leach field area. Duplicate samples were collected, with the duplicate going to personnel from Litton Industries. One soil background sample was collected from the eastern front lawn of the Litton property. Soil samples were collected by drilling approximately twelve inches into the soil using a one and one-half inch diameter hand auger, collecting the cuttings in a clean aluminum tray, thoroughly mixing the aliquots (if applicable), and spooning the sample into appropriate sample containers supplied by the Divisional Laboratory.

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Litton Industries  
Springfield, Missouri  
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Information received from the Department's Division of Geology and Land Survey indicates that the former leach field area at Litton Industries serves as a recharge to Ritter Springs West, north of the Litton site. One spring water sample was collected by submerging the sample containers in the pool at the mouth of the spring. One spring sediment sample was collected from below the spring pool by spooning sediment from the creek bottom at the overflow from the spring pool.

Three private drinking water wells were sampled by filling appropriate containers directly from well hydrants. The private drinking water wells were all located between Litton Industries property and Ritter Springs West, along the north service road to I-44. All water samples collected for dissolved metals analyses were field filtered using disposable 0.45 micron filtering units. All water samples collected for total and dissolved metals analyses were preserved with nitric acid.

well volumes  
pumped first?  
~~well never know~~

All samples collected were hand carried to the Divisional Laboratory in Jefferson City for analyses. Sample analyses requested specific for Litton Industries include VOA, total and TEP metals (copper, nickel, arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) for soil and sediment samples, and VOA, total and dissolved metals (copper, nickel, arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) for water samples. The samples collected from the Mike LeFors private well and Ritter Springs West were also analyzed for base neutrals. These two sampling points were also sampling points for the National Oil sampling investigation.

#### OBSERVATIONS

The area of Litton Industry property that was formerly used for land application of liquid waste maintains some semblance to a terraced leach field. Surface soil is of a cherty silt loam, and supports only sparse vegetation. No unusual conditions were observed at Ritter Springs West, or at any of the private drinking water wells sampled.

#### RESULTS

The results of laboratory analysis of samples collected are attached as Appendix B.

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Litton Industries  
Springfield, Missouri  
January 27, 1988

Submitted by

Kenneth R. Teeter  
Kenneth R. Teeter  
Environmental Emergency Specialist  
Field Services Section  
Laboratory Services Program

Date

October 21, 1988

Approved by

Douglas N. Edwards  
James H. Long  
Director  
Laboratory Services Program

JHL/KT:jrr

cc: Keith Schardein, Section Chief, Waste Management Program  
John Nixon, Regional Administrator, Springfield Regional Office

APPENDIX A

SITE MAP

Report of Sampling Investigation  
Litton Industries  
Springfield, Missouri  
January 27, 1988

Site MAP  
Litton Industries  
SPRINGFIELD MO.

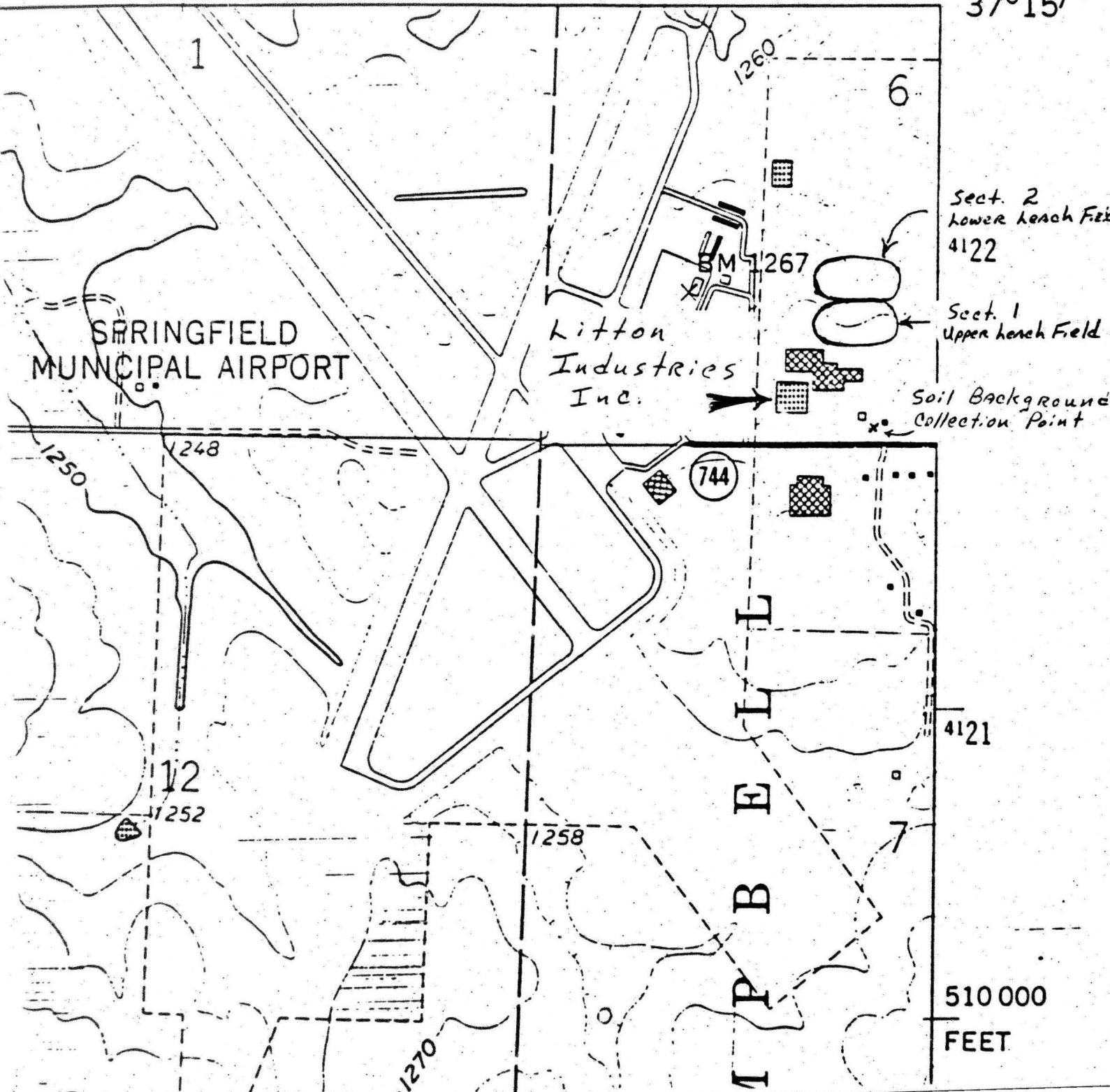
BROOKLINE QUADRANGLE  
MISSOURI—GREENE CO.  
7.5 MINUTE SERIES (TOPOGRAPHIC)

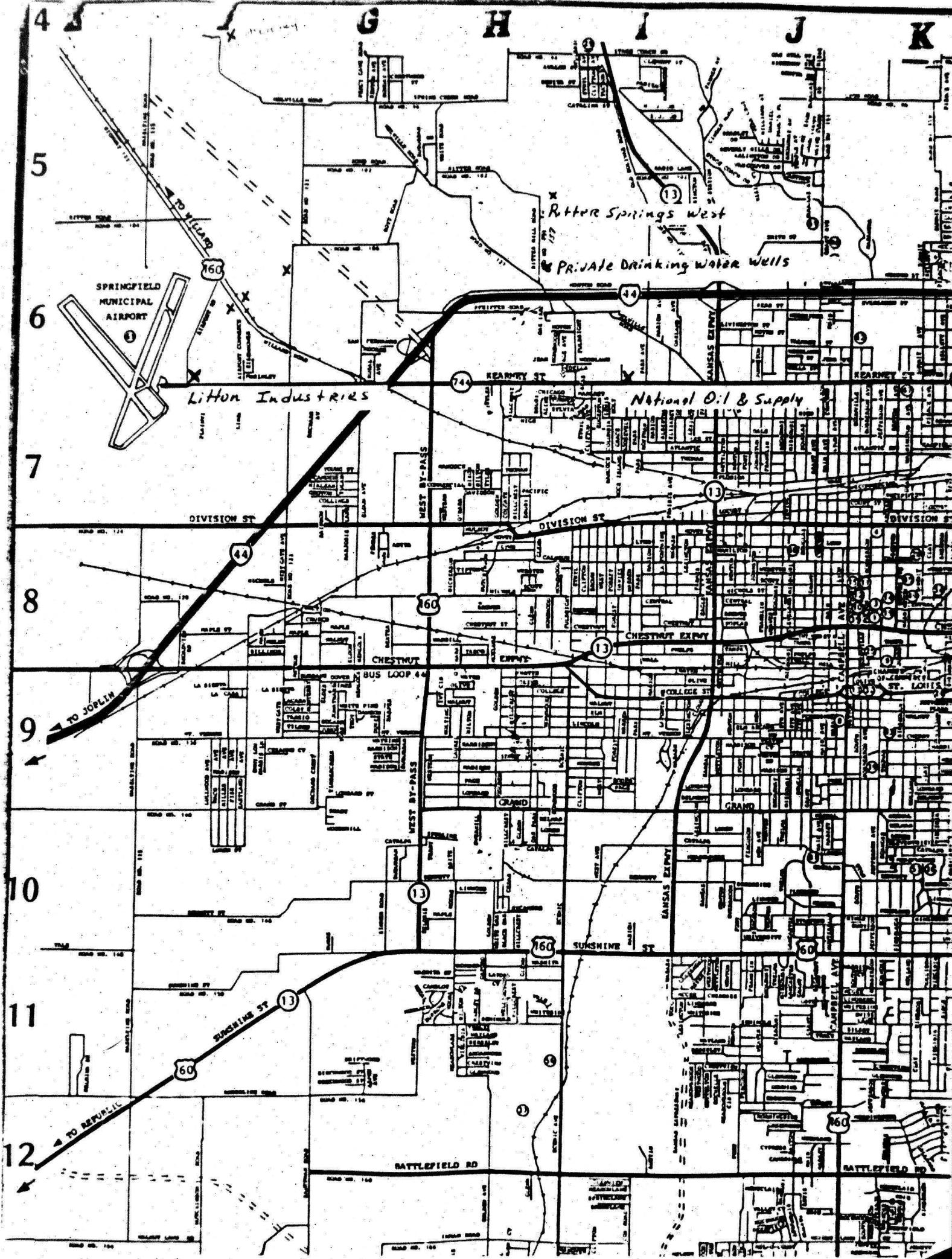
7358  
(EBEN'S)

465 240 000 FEET R. 23 W. R. 22 W.

93°22'30"

37°15'





**APPENDIX B**

**RESULTS OF LABORATORY ANALYSIS**

**Report of Sampling Investigation  
Litton Industries  
Springfield, Missouri  
January 27, 1988**

**LABORATORY SERVICES PROGRAM  
RESULT OF SAMPLE ANALYSIS**

**Sample No. 88-0198**

**Reported to: KEN TEETER  
Affiliation: EER**

**Date: 4/12/88  
Project Code: 3535/3000**

**Sample Description:  
LITTON INDUSTRIES  
UPPER LEACH FIELD  
SOIL COMPOSITE (5 ALIQUOTS)**

**Collected by: KEN TEETER  
Affiliation: EER**

**Date: 01/27/88**

**PARAMETERS**

**TOTAL SILVER**

**COMMENTS : DRY WEIGHT**

**TEP SILVER**

**TOTAL ARSENIC**

**COMMENTS : DRY WEIGHT**

**TEP ARSENIC**

**TOTAL BARIUM**

**COMMENTS : DRY WEIGHT**

**TEP BARIUM**

**TOTAL CADMIUM**

**COMMENTS : DRY WEIGHT**

**TEP CADMIUM**

**TOTAL CHROMIUM**

**COMMENTS : DRY WEIGHT**

**TEP CHROMIUM**

**TOTAL COPPER**

**RESULTS**

**1,000 ug/Kg**

**<2,500 ug/L**

**33,000 ug/Kg**

**<5,000 ug/L**

**210,000 ug/Kg**

**<100,000 ug/L**

**400 ug/Kg**

**<500 ug/L**

**390,000 ug/Kg**

**<2,500 ug/L**

**4,500,000 ug/Kg**

Page 2  
Sample no. 88-0198  
Date 4/12/88

**PARAMETERS**

COMMENTS : DRY WEIGHT

TEP COPPER

**RESULTS**

140 ug/L

TOTAL MERCURY

400 ug/Kg

COMMENTS : DRY WEIGHT

TEP MERCURY

<100 ug/L

TOTAL NICKEL

61,000 ug/Kg

COMMENTS : DRY WEIGHT

TEP NICKEL

70 ug/L

TOTAL LEAD

290,000 ug/Kg

COMMENTS : DRY WEIGHT

TEP LEAD

<2,500 ug/L

TOTAL SELENIUM

260 ug/Kg

COMMENTS : DRY WEIGHT

TEP SELENIUM

<1,000 ug/L

Acrolein

Not analyzed

Acrylonitrile

Not analyzed

Acetone

< 2500 ug/Kg

Benzene

< 620 ug/Kg

Bromomethane

< 1200 ug/Kg

Bromodichloromethane

< 620 ug/Kg

Bromoform

< 620 ug/Kg

2-Butanone

< 1200 ug/Kg

Carbon Disulfide

< 620 ug/Kg

Carbon Tetrachloride

< 620 ug/Kg

Chlorobenzene

< 620 ug/Kg

Chloroethane

< 1200 ug/Kg

2-Chloroethylvinyl ether

Not Analyzed

Chloroform

< 620 ug/Kg

Chloromethane

< 1200 ug/Kg

Dibromochloromethane

< 620 ug/Kg

Page 3  
Sample no. 88-0198  
Date 4/12/88

<u>PARAMETERS</u>	<u>RESULTS</u>
1,1-Dichloroethane	< 620 ug/Kg
1,2-Dichloroethane	< 620 ug/Kg
1,1-Dichloroethylene	< 620 ug/Kg
1,2-Dichloroethylene	< 620 ug/Kg
1,2-Dichloropropane	< 620 ug/Kg
cis-1,3-Dichloropropene	< 620 ug/Kg
trans-1,3-Dichloropropene	< 620 ug/Kg
Ethylbenzene	< 620 ug/Kg
2-Hexanone	< 1200 ug/Kg
Methylene Chloride	< 1200 ug/Kg
4-Methyl-2-Pentanone	< 1200 ug/Kg
Styrene	< 620 ug/Kg
1,1,2,2-Tetrachloroethane	< 620 ug/Kg
Tetrachloroethylene	< 620 ug/Kg
1,1,1-Trichloroethane	1500 ug/Kg
1,1,2-Trichloroethane	< 620 ug/Kg
Trichloroethylene	29000 ug/Kg
Trichlorofluoromethane	Not analyzed
Toluene	< 620 ug/Kg
Total Xylenes	< 620 ug/Kg
Vinyl Acetate	< 1200 ug/Kg
Vinyl Chloride	< 1200 ug/Kg

COMMENTS: Analyzed by GC/MS at Pace  
Laboratories ,Inc.

LABORATORY SERVICES PROGRAM  
RESULT OF SAMPLE ANALYSIS

Sample No. 88-0220

Reported to: KEN TEETER  
Affiliation: EER

Date: 4/18/88  
Project Code: 3535/3000

Sample Description:  
LITTON INDUSTRIES  
LOWER LEACH FIELD  
SOIL COMPOSITE (6 ALIQUOTS)

Collected by: KEN TEETER  
Affiliation: EER

Date: 01/27/88

PARAMETERS

TOTAL SILVER

COMMENTS : DRY WEIGHT

RESULTS

400 ug/Kg

TEP SILVER

<2,500 ug/L

TOTAL ARSENIC

COMMENTS : DRY WEIGHT

3,800 ug/Kg

TEP ARSENIC

<5,000 ug/L

TOTAL BARIUM

COMMENTS : DRY WEIGHT

180,000 ug/Kg

TEP BARIUM

<100,000 ug/L

TOTAL CADMIUM

COMMENTS : DRY WEIGHT

400 ug/Kg

TEP CADMIUM

<500 ug/L

TOTAL CHROMIUM

COMMENTS : DRY WEIGHT

31,000 ug/Kg

TEP CHROMIUM

<2,500 ug/L

TOTAL COPPER

580,000 ug/Kg

Page 2  
Sample no. 88-0220  
Date 4/18/88

**PARAMETERS**

COMMENTS : DRY WEIGHT

TEP COPPER

TOTAL MERCURY

COMMENTS : DRY WEIGHT

TEP MERCURY

TOTAL NICKEL

COMMENTS : DRY WEIGHT

TEP NICKEL

TOTAL LEAD

COMMENTS : DRY WEIGHT

TEP LEAD

TOTAL SELENIUM

COMMENTS : DRY WEIGHT

TEP SELENIUM

Acrolein

Acrylonitrile

Acetone

Benzene

Bromomethane

Bromodichloromethane

Bromoform

2-Butanone

Carbon Disulfide

Carbon Tetrachloride

Chlorobenzene

Chloroethane

2-Chloroethylvinyl ether

Chloroform

Chloromethane

Dibromochloromethane

**RESULTS**

50 ug/L

220 ug/Kg

<100 ug/L

37,000 ug/Kg

60 ug/L

41,000 ug/Kg

<2,500 ug/L

420 ug/Kg

<1,000 ug/L

Not analyzed

Not analyzed

< 2500 ug/Kg

< 620 ug/Kg

< 1200 ug/Kg

< 620 ug/Kg

< 620 ug/Kg

< 1200 ug/Kg

< 620 ug/Kg

< 620 ug/Kg

< 620 ug/Kg

< 1200 ug/Kg

Not Analyzed

< 620 ug/Kg

< 1200 ug/Kg

< 620 ug/Kg

Page 3

Sample no. 88-0220

Date 4/18/88

PARAMETERS

1,1-Dichloroethane  
1,2-Dichloroethane  
1,1-Dichloroethylene  
1,2-Dichloroethylene  
1,2-Dichloropropane  
*cis*-1,3-Dichloropropene  
*trans*-1,3-Dichloropropene  
Ethylbenzene  
2-Hexanone  
Methylene Chloride  
4-Methyl-2-Pentanone  
Styrene  
1,1,2,2-Tetrachloroethane  
Tetrachloroethylene  
1,1,1-Trichloroethane  
1,1,2-Trichloroethane  
Trichloroethylene  
Trichlorofluoromethane  
Toluene  
Total Xylenes  
Vinyl Acetate  
Vinyl Chloride

RESULTS

< 620 ug/Kg  
< 1200 ug/Kg  
< 1200 ug/Kg  
< 1200 ug/Kg  
< 620 ug/Kg  
2200 ug/Kg  
Not analyzed  
< 620 ug/Kg  
< 620 ug/Kg  
< 1200 ug/Kg  
< 1200 ug/Kg

COMMENTS: Analyzed by GC/MS at Pace  
Laboratories , Inc.

**LABORATORY SERVICES PROGRAM  
RESULT OF SAMPLE ANALYSIS**

**Sample No. 88-0221**

**Reported to: KEN TEETER  
Affiliation: EER**

**Date: 4/18/88  
Project Code: 3535/3000**

**Sample Description:  
LITTON INDUSTRIES  
SOIL BACKGROUND**

**Collected by: KEN TEETER  
Affiliation: EER**

**Date: 01/27/88**

**PARAMETERS**

**TOTAL SILVER**

**COMMENTS : DRY WEIGHT**

**RESULTS**

**200 ug/Kg**

**TEP SILVER**

**<2,500 ug/L**

**TOTAL ARSENIC**

**COMMENTS : DRY WEIGHT**

**3,200 ug/Kg**

**TEP ARSENIC**

**<5,000 ug/L**

**TOTAL BARIUM**

**COMMENTS : DRY WEIGHT**

**150,000 ug/Kg**

**TEP BARIUM**

**<100,000 ug/L**

**TOTAL CADMIUM**

**COMMENTS : DRY WEIGHT**

**400 ug/Kg**

**TEP CADMIUM**

**<500 ug/L**

**TOTAL CHROMIUM**

**COMMENTS : DRY WEIGHT**

**12,000 ug/Kg**

**TEP CHROMIUM**

**<2,500 ug/L**

**TOTAL COPPER**

**COMMENTS : DRY WEIGHT**

**7,200 ug/Kg**

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Sample no. 88-0221

Date 4/18/88

PARAMETERS

TEP COPPER

TOTAL MERCURY

COMMENTS : DRY WEIGHT

TEP MERCURY

TOTAL NICKEL

COMMENTS : DRY WEIGHT

TEP NICKEL

TOTAL LEAD

COMMENTS : DRY WEIGHT

TEP LEAD

TOTAL SELENIUM

COMMENTS : DRY WEIGHT

TEP SELENIUM

Acrolein

Acrylonitrile

Acetone

Benzene

Bromomethane

Bromodichloromethane

Bromoform

2-Butanone

Carbon Disulfide

Carbon Tetrachloride

Chlorobenzene

Chloroethane

2-Chloroethylvinyl ether

Chloroform

Chloromethane

Dibromochloromethane

1,1-Dichloroethane

1,2-Dichloroethane

RESULTS

<10 ug/L

220 ug/Kg

<100 ug/L

21,000 ug/Kg

30 ug/L

25,000 ug/Kg

<2,500 ug/L

<210 ug/Kg

<1,000 ug/L

Not analyzed

Not analyzed

< 2500 ug/Kg

< 620 ug/Kg

< 1200 ug/Kg

< 620 ug/Kg

< 620 ug/Kg

< 1200 ug/Kg

< 620 ug/Kg

< 620 ug/Kg

< 1200 ug/Kg

Not Analyzed

< 620 ug/Kg

< 1200 ug/Kg

< 620 ug/Kg

< 620 ug/Kg

< 620 ug/Kg

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Sample no. 88-0221

Date 4/18/88

**PARAMETERS**

1,1-Dichloroethylene	< 620	ug/Kg
1,2-Dichloroethylene	< 620	ug/Kg
1,2-Dichloropropane	< 620	ug/Kg
cis-1,3-Dichloropropene	< 620	ug/Kg
trans-1,3-Dichloropropene	< 620	ug/Kg
Ethylbenzene	< 620	ug/Kg
2-Hexanone	< 1200	ug/Kg
Methylene Chloride	< 1200	ug/Kg
4-Methyl-2-Pentanone	< 1200	ug/Kg
Styrene	< 620	ug/Kg
1,1,2,2-Tetrachloroethane	< 620	ug/Kg
Tetrachloroethylene	< 620	ug/Kg
1,1,1-Trichloroethane	< 620	ug/Kg
1,1,2-Trichloroethane	< 620	ug/Kg
Trichloroethylene	< 620	ug/Kg
Trichlorofluoromethane	Not analyzed	
Toluene	< 620	ug/Kg
Total Xylenes	< 620	ug/Kg
Vinyl Acetate	< 1200	ug/Kg
Vinyl Chloride	< 1200	ug/Kg

**RESULTS**

COMMENTS: Analyzed by GC/MS at Pace  
Laboratories ,Inc.

**LABORATORY SERVICES PROGRAM  
RESULT OF SAMPLE ANALYSIS**

**Sample No. 88-0196**

**Reported to: KEN TEETER  
Affiliation: EER**

**Date: 4/07/88  
Project Code: 3535/3000**

**Sample Description:**

NATIONAL OIL, LITTON, MONO  
MIKE LeFORS PRIVATE WELL  
SPRINGFIELD

**Collected by: KEN TEETER  
Affiliation: EER**

**Date: 01/27/88**

**PARAMETERS**

**DISS. SILVER**

**TOTAL SILVER**

**DISS. ARSENIC**

**TOTAL ARSENIC**

**DISS. BARIUM**

**TOTAL BARIUM**

**DISS. CADMIUM**

**TOTAL CADMIUM**

**DISS. CHROMIUM**

**TOTAL CHROMIUM**

**DISS. COPPER**

**TOTAL COPPER**

**DISS. MERCURY**

**RESULTS**

**<1 ug/L**

**<1 ug/L**

**<5 ug/L**

**<5 ug/L**

**62 ug/L**

**51 ug/L**

**<2 ug/L**

**<2 ug/L**

**6.7 ug/L**

**<5 ug/L**

**<5 ug/L**

**40 ug/L**

**<.5 ug/L**

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Sample no. 88-0196  
Date 4/07/88

**PARAMETERS**

TOTAL MERCURY

DISS. NICKEL

TOTAL NICKEL

DISS. LEAD

TOTAL LEAD

DISS. SELENIUM

TOTAL SELENIUM

Acrolein

Acrylonitrile

Acetone

Benzene

Bromomethane

Bromodichloromethane

Bromoform

2-Butanone

Carbon Disulfide

Carbon Tetrachloride

Chlorobenzene

Chloroethane

2-Chloroethylvinyl ether

Chloroform

Chloromethane

Dibromochloromethane

1,1-Dichloroethane

1,2-Dichloroethane

1,1-Dichloroethylene

1,2-Dichloroethylene

1,2-Dichloropropane

cis-1,3-Dichloropropene

trans-1,3-Dichloropropene

Ethylbenzene

2-Hexanone

Methylene Chloride

**RESULTS**

<.5 ug/L

<50 ug/L

<50 ug/L

6.1 ug/L

<5 ug/L

<5 ug/L

<5 ug/L

Not analyzed

Not analyzed

< 20 ug/L

< 5.0 ug/L

< 10 ug/L

< 5.0 ug/L

< 5.0 ug/L

< 10 ug/L

< 5.0 ug/L

< 5.0 ug/L

< 10 ug/L

Not Analyzed

< 5.0 ug/L

< 10 ug/L

< 5.0 ug/L

< 10 ug/L

24 ug/L

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Sample no. 88-0196

Date 4/07/88

PARAMETERS

RESULTS

4-Methyl-2-Pentanone	< 10	ug/L
Styrene	< 5.0	ug/L
1,1,2,2-Tetrachloroethane	< 5.0	ug/L
Tetrachloroethylene	< 5.0	ug/L
1,1,1-Trichloroethane	< 5.0	ug/L
1,1,2-Trichloroethane	< 5.0	ug/L
Trichloroethylene	< 5.0	ug/L
Trichlorofluoromethane	Not analyzed	
Toluene	< 5.0	ug/L
Total Xylenes	< 5.0	ug/L
Vinyl Acetate	< 10	ug/L
Vinyl Chloride	< 10	ug/L

COMMENTS: Analyzed by GC/MS at Pace  
Laboratories ,Inc.

Acenaphthene	< 5.0	ug/L
Acenaphthylene	< 5.0	ug/L
Aniline	< 5.0	ug/L
Anthracene	< 5.0	ug/L
Benzo(a)anthracene	< 5.0	ug/L
Benzo(a)pyrene	< 5.0	ug/L
Benzo(b)fluoranthene	< 5.0	ug/L
Benzo(ghi)perylene	< 5.0	ug/L
Benzoic acid	< 20	ug/L
Benzo(k)fluoranthene	< 5.0	ug/L
Benzyl alcohol	< 10	ug/L
Bis(2-chloroethoxy)methane	< 5.0	ug/L
Bis(2-chloroethyl)ether	< 5.0	ug/L
Bis(2-chloroisopropyl)ether	< 5.0	ug/L
Bis(2-ethylhexyl)phthalate	< 5.0	ug/L
4-Bromophenyl phenyl ether	< 5.0	ug/L
Butyl benzyl phthalate	< 5.0	ug/L
4-Chloroaniline	< 5.0	ug/L
2-Chloronaphthalene	< 5.0	ug/L
4-Chlorophenyl phenyl ether	< 5.0	ug/L
Chrysene	< 5.0	ug/L
Dibenzo(a,h)anthracene	< 5.0	ug/L
Dibenzofuran	< 5.0	ug/L
1,2-Dichlorobenzene	< 5.0	ug/L
1,3-Dichlorobenzene	< 5.0	ug/L

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Sample no. 88-0196  
Date 4/07/88

**PARAMETERS**

**RESULTS**

1,4-Dichlorobenzene	< 5.0	ug/L
3,3-Dichlorobenzidine	< 50	ug/L
Diethylphthalate	< 5.0	ug/L
Dimethylphthalate	< 5.0	ug/L
Di-N-Butylphthalate	< 5.0	ug/L
2,4-Dinitrotoluene	< 5.0	ug/L
2,6-Dinitrotoluene	< 5.0	ug/L
Di-n-octyl phthalate	< 5.0	ug/L
Fluoranthene	< 5.0	ug/L
Fluorene	< 5.0	ug/L
Hexachlorobenzene	< 5.0	ug/L
Hexachlorobutadiene	< 5.0	ug/L
Hexachlorocyclopentadiene	< 10	ug/L
Hexachloroethane	< 5.0	ug/L
Indeno(1,2,3-cd)pyrene	< 5.0	ug/L
Isophorone	< 5.0	ug/L
2-Methylnaphthalene	< 5.0	ug/L
Naphthalene	< 5.0	ug/L
2-Nitroaniline	< 10	ug/L
3-Nitroaniline	< 10	ug/L
4-Nitroaniline	< 20	ug/L
N-Nitrosodimethylamine	< 5.0	ug/L
N-Nitrosodi-n-propylamine	< 5.0	ug/L
N-Nitrosodiphenylamine	< 5.0	ug/L
Phenanthrene	< 5.0	ug/L
Pyrene	< 5.0	ug/L
1,2,4-Trichlorobenzene	< 5.0	ug/L

COMMENTS: Analyzed by GC/MS at the Missouri Department of Natural Resources Laboratory.

**LABORATORY SERVICES PROGRAM  
RESULT OF SAMPLE ANALYSIS**

**Sample No. 88-0223**

**Reported to: KEN TEETER  
Affiliation: EER**

**Date: 3/24/88  
Project Code: 3535/3000**

**Sample Description:  
LITTON INDUSTRIES  
GARNER PRIVATE WELL**

**Collected by: KEN TEETER  
Affiliation: EER**

**Date: 01/27/88**

**PARAMETERS**

**DISS. SILVER**

**RESULTS**

**<1 ug/L**

**TOTAL SILVER**

**<1 ug/L**

**DISS. ARSENIC**

**<5 ug/L**

**TOTAL ARSENIC**

**<5 ug/L**

**DISS. BARIUM**

**67 ug/L**

**TOTAL BARIUM**

**<23 ug/L**

**DISS. CADMIUM**

**<2 ug/L**

**TOTAL CADMIUM**

**<2 ug/L**

**DISS. CHROMIUM**

**8.3 ug/L**

**TOTAL CHROMIUM**

**<5 ug/L**

**DISS. COPPER**

**<5 ug/L**

**TOTAL COPPER**

**30 ug/L**

**DISS. MERCURY**

**<.5 ug/L**

**TOTAL MERCURY**

**<.5 ug/L**

Page 2  
Sample no. 88-0223  
Date 3/24/88

PARAMETERS

DISS. NICKEL

TOTAL NICKEL

DISS. LEAD

TOTAL LEAD

DISS. SELENIUM

TOTAL SELENIUM

Acrolein

Acrylonitrile

Acetone

Benzene

Bromomethane

Bromodichloromethane

Bromoform

2-Butanone

Carbon Disulfide

Carbon Tetrachloride

Chlorobenzene

Chloroethane

2-Chloroethylvinyl ether

Chloroform

Chloromethane

Dibromochloromethane

1,1-Dichloroethane

1,2-Dichloroethane

1,1-Dichloroethylene

1,2-Dichloroethylene

1,2-Dichloropropane

cis-1,3-Dichloropropene

trans-1,3-Dichloropropene

Ethylbenzene

2-Hexanone

Methylene Chloride

4-Methyl-2-Pentanone

Styrene

RESULTS

<50 ug/L

<50 ug/L

<5 ug/L

<5 ug/L

<5 ug/L

<5 ug/L

Not analyzed

Not analyzed

< 20 ug/L

< 5.0 ug/L

< 10 ug/L

< 5.0 ug/L

< 5.0 ug/L

< 10 ug/L

7.7 ug/L

< 5.0 ug/L

< 5.0 ug/L

< 10 ug/L

Not Analyzed

< 5.0 ug/L

< 10 ug/L

< 5.0 ug/L

**Page 3**  
**Sample no. 88-0223**  
**Date 3/24/88**

**PARAMETERS**

1,1,2,2-Tetrachloroethane  
Tetrachloroethylene  
1,1,1-Trichloroethane  
1,1,2-Trichloroethane  
Trichloroethylene  
Trichlorofluoromethane  
Toluene  
Total Xylenes  
Vinyl Acetate  
Vinyl Chloride

**RESULTS**

< 5.0 ug/L  
Not analyzed  
< 5.0 ug/L  
< 5.0 ug/L  
< 10 ug/L  
< 10 ug/L

**COMMENTS:** Analyzed by GC/MS at Pace  
Laboratories ,Inc.

**LABORATORY SERVICES PROGRAM  
RESULT OF SAMPLE ANALYSIS**

**Sample No. 88-0222**

**Reported to: KEN TEETER  
Affiliation: EER**

**Date: 3/30/88  
Project Code: 3535/3000**

**Sample Description:  
LITTON INDUSTRIES  
McCROSKEY PRIVATE WELL**

**Collected by: KEN TEETER  
Affiliation: EER**

**Date: 01/27/88**

**PARAMETERS**

**DISS. SILVER**

**TOTAL SILVER**

**DISS. ARSENIC**

**TOTAL ARSENIC**

**DISS. BARIUM**

**TOTAL BARIUM**

**DISS. CADMIUM**

**TOTAL CADMIUM**

**DISS. CHROMIUM**

**TOTAL CHROMIUM**

**DISS. COPPER**

**TOTAL COPPER**

**DISS. MERCURY**

**TOTAL MERCURY**

**RESULTS**

**<1 ug/L**

**<1 ug/L**

**<5 ug/L**

**<5 ug/L**

**120 ug/L**

**63 ug/L**

**<2 ug/L**

**<2 ug/L**

**7.0 ug/L**

**<5 ug/L**

**<5 ug/L**

**40 ug/L**

**<.5 ug/L**

**<.5 ug/L**

Page 2  
Sample no. 88-0222  
Date 3/30/88

**PARAMETERS**

DISS. NICKEL

TOTAL NICKEL

DISS. LEAD

TOTAL LEAD

DISS. SELENIUM

TOTAL SELENIUM

Acrolein

Acrylonitrile

Acetone

Benzene

Bromomethane

Bromodichloromethane

Bromoform

2-Butanone

Carbon Disulfide

Carbon Tetrachloride

Chlorobenzene

Chloroethane

2-Chloroethylvinyl ether

Chloroform

Chloromethane

Dibromochloromethane

1,1-Dichloroethane

1,2-Dichloroethane

1,1-Dichloroethylene

1,2-Dichloroethylene

1,2-Dichloropropane

cis-1,3-Dichloropropene

trans-1,3-Dichloropropene

Ethylbenzene

2-Hexanone

Methylene Chloride

4-Methyl-2-Pentanone

Styrene

**RESULTS**

<50 ug/L

<50 ug/L

<5 ug/L

<5 ug/L

<5 ug/L

<5 ug/L

Not analyzed

Not analyzed

< 20 ug/L

< 5.0 ug/L

< 10 ug/L

< 5.0 ug/L

< 10 ug/L

Not Analyzed

< 5.0 ug/L

< 10 ug/L

< 5.0 ug/L

< 10 ug/L

< 10 ug/L

< 10 ug/L

< 5.0 ug/L

**Page 3**  
**Sample no. 88-0222**  
**Date 3/30/88**

**PARAMETERS**

1,1,2,2-Tetrachloroethane  
Tetrachloroethylene  
1,1,1-Trichloroethane  
1,1,2-Trichloroethane  
Trichloroethylene  
Trichlorofluoromethane  
Toluene  
Total Xylenes  
Vinyl Acetate  
Vinyl Chloride

**RESULTS**

< 5.0 ug/L  
< 5.0 ug/L  
< 5.0 ug/L  
< 5.0 ug/L  
44 ug/L  
Not analyzed  
< 5.0 ug/L  
< 5.0 ug/L  
< 10 ug/L  
< 10 ug/L

**COMMENTS:** Analyzed by GC/MS at Pace  
Laboratories ,Inc.

LABORATORY SERVICES PROGRAM  
RESULT OF SAMPLE ANALYSIS

Sample No. 88-0186 Sample No. 88-0186

KEN TEE  
SER  
Reported to: KEN TEETER  
Affiliation: EER

Date: 4/04/88  
Project Code: 3535/3000  
Date: 4/04/88  
Project Code: 3535/3000

option:  
NCG WDCM  
Sample Description:  
RITTER SPRINGS WEST  
WATER

Collected by: KEN TEETER  
Affiliation: EER

Date: 01/27/88

PARAMETERS

DISS. SILVER

RESULTS

<1 ug/L

TOTAL SILVER

<1 ug/L

DISS. ARSENIC

<5 ug/L

TOTAL ARSENIC

<5 ug/L

DISS. BARIUM

84 ug/L

TOTAL BARIUM

87 ug/L

DISS. CADMIUM

<2 ug/L

TOTAL CADMIUM

<10 ug/L

DISS. CHROMIUM

8.3 ug/L

TOTAL CHROMIUM

<5 ug/L

DISS. COPPER

<5 ug/L

TOTAL COPPER

40 ug/L

DISS. MERCURY

<.5 ug/L

TOTAL MERCURY

NO RESULT

Page 2  
Sample no. 88-0186  
Date 4/04/88

**PARAMETERS**

**COMMENTS : SAMPLE LOST**

**DISS. NICKEL**

**RESULTS**

<50 ug/L

**TOTAL NICKEL**

80 ug/L

**DISS. SELENIUM**

<5 ug/L

**TOTAL SELENIUM**

<5 ug/L

Acrolein

Not analyzed

Acrylonitrile

Not analyzed

Acetone

< 20 ug/L

Benzene

< 5.0 ug/L

Bromomethane

< 10 ug/L

Bromodichloromethane

< 5.0 ug/L

Bromoform

< 5.0 ug/L

2-Butanone

< 10 ug/L

Carbon Disulfide

< 5.0 ug/L

Carbon Tetrachloride

< 5.0 ug/L

Chlorobenzene

< 5.0 ug/L

Chloroethane

< 10 ug/L

2-Chloroethylvinyl ether

Not Analyzed

Chloroform

< 5.0 ug/L

Chloromethane

< 10 ug/L

Dibromochloromethane

< 5.0 ug/L

1,1-Dichloroethane

< 5.0 ug/L

1,2-Dichloroethane

< 5.0 ug/L

1,1-Dichloroethylene

< 5.0 ug/L

1,2-Dichloroethylene

< 5.0 ug/L

1,2-Dichloropropane

< 5.0 ug/L

cis-1,3-Dichloropropene

< 5.0 ug/L

trans-1,3-Dichloropropene

< 5.0 ug/L

Ethylbenzene

< 5.0 ug/L

2-Hexanone

< 10 ug/L

Methylene Chloride

< 10 ug/L

4-Methyl-2-Pentanone

< 10 ug/L

Styrene

< 5.0 ug/L

1,1,2,2-Tetrachloroethane

< 5.0 ug/L

Tetrachloroethylene

< 5.0 ug/L

Page 3  
Sample no. 88-0186  
Date 4/04/88

**PARAMETERS**

1,1,1-Trichloroethane  
1,1,2-Trichloroethane  
Trichloroethylene  
Trichlorofluoromethane  
Toluene  
Total Xylenes  
Vinyl Acetate  
Vinyl Chloride

COMMENTS: Analyzed by GC/MS at Pace  
Laboratories ,Inc.

**RESULTS**

< 5.0 ug/L  
< 5.0 ug/L  
68 ug/L  
Not analyzed  
< 5.0 ug/L  
< 5.0 ug/L  
< 10 ug/L  
< 10 ug/L

Acenaphthene	< 5.0	ug/L
Acenaphthylene	< 5.0	ug/L
Aniline	< 5.0	ug/L
Anthracene	< 5.0	ug/L
Benzo(a)anthracene	< 5.0	ug/L
Benzo(a)pyrene	< 5.0	ug/L
Benzo(b)fluoranthene	< 5.0	ug/L
Benzo(ghi)perylene	< 5.0	ug/L
Benzoic acid	< 20	ug/L
Benzo(k)fluoranthene	< 5.0	ug/L
Benzyl alcohol	< 10	ug/L
Bis(2-chloroethoxy)methane	< 5.0	ug/L
Bis(2-chloroethyl)ether	< 5.0	ug/L
Bis(2-chloroisopropyl)ether	< 5.0	ug/L
Bis(2-ethylhexyl)phthalate	< 5.0	ug/L
4-Bromophenyl phenyl ether	< 5.0	ug/L
Butyl benzyl phthalate	< 5.0	ug/L
4-Chloroaniline	< 5.0	ug/L
2-Choronaphthalene	< 5.0	ug/L
4-Chlorophenyl phenyl ether	< 5.0	ug/L
Chrysene	< 5.0	ug/L
Dibenzo(a,h)anthracene	< 5.0	ug/L
Dibenzofuran	< 5.0	ug/L
1,2-Dichlorobenzene	< 5.0	ug/L
1,3-Dichlorobenzene	< 5.0	ug/L
1,4-Dichlorobenzene	< 5.0	ug/L
3,3-Dichlorobenzidine	< 50	ug/L
Diethylphthalate	< 5.0	ug/L
Dimethylphthalate	< 5.0	ug/L

Page 4  
Sample no. 88-0186  
Date 4/04/88

<u>PARAMETERS</u>	<u>RESULTS</u>	
Di-N-Butylphthalate	< 5.0	ug/L
2,4-Dinitrotoluene	< 5.0	ug/L
2,6-Dinitrotoluene	< 5.0	ug/L
Di-n-octyl phthalate	< 5.0	ug/L
Fluoranthene	< 5.0	ug/L
Fluorene	< 5.0	ug/L
Hexachlorobenzene	< 5.0	ug/L
Hexachlorobutadiene	< 5.0	ug/L
Hexachlorocyclopentadiene	< 10	ug/L
Hexachloroethane	< 5.0	ug/L
Indeno(1,2,3-cd)pyrene	< 5.0	ug/L
Isophorone	< 5.0	ug/L
2-Methylnaphthalene	< 5.0	ug/L
Naphthalene	< 5.0	ug/L
2-Nitroaniline	< 10	ug/L
3-Nitroaniline	< 10	ug/L
4-Nitroaniline	< 20	ug/L
N-Nitrosodimethylamine	< 5.0	ug/L
N-Nitrosodi-n-propylamine	< 5.0	ug/L
N-Nitrosodiphenylamine	< 5.0	ug/L
Phenanthrene	< 5.0	ug/L
Pyrene	< 5.0	ug/L
1,2,4-Trichlorobenzene	< 5.0	ug/L

COMMENTS: Analyzed by GC/MS at the Missouri  
Department of Natural Resources Laboratory.

**LABORATORY SERVICES PROGRAM  
RESULT OF SAMPLE ANALYSIS**

**Sample No. 88-0187**

**Reported to: KEN TEETER  
Affiliation: EER**

**Date: 4/01/88  
Project Code: 3535/3000**

**Sample Description:  
RITTER SPRINGS WEST  
SEDIMENT**

**Collected by: KEN TEETER  
Affiliation: EER**

**Date: 01/27/88**

**PARAMETERS**

**TOTAL SILVER**

**COMMENTS : DRY WEIGHT**

**TEP SILVER**

**TOTAL ARSENIC**

**COMMENTS : DRY WEIGHT**

**TEP ARSENIC**

**TOTAL BARIUM**

**COMMENTS : DRY WEIGHT**

**TEP BARIUM**

**TOTAL CADMIUM**

**COMMENTS : DRY WEIGHT**

**TEP CADMIUM**

**TOTAL CHROMIUM**

**COMMENTS : DRY WEIGHT**

**TEP CHROMIUM**

**TOTAL COPPER**

**COMMENTS : DRY WEIGHT**

**RESULTS**

**600 ug/Kg**

**<2,500 ug/L**

**11,000 ug/Kg**

**<5,000 ug/L**

**150,000 ug/Kg**

**<100,000 ug/L**

**1,200 ug/Kg**

**<500 ug/L**

**39,000 ug/Kg**

**<2,500 ug/L**

**620,000 ug/Kg**

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Sample no. 88-0187  
Date 4/01/88

**PARAMETERS**

TEP COPPER

TOTAL MERCURY

COMMENTS : DRY WEIGHT

TEP MERCURY

TOTAL NICKEL

COMMENTS : DRY WEIGHT

TEP NICKEL

TOTAL SELENIUM

COMMENTS : DRY WEIGHT

TEP SELENIUM

Acrolein

Acrylonitrile

Acetone

Benzene

Bromomethane

Bromodichloromethane

Bromoform

2-Butanone

Carbon Disulfide

Carbon Tetrachloride

Chlorobenzene

Chloroethane

2-Chloroethylvinyl ether

Chloroform

Chloromethane

Dibromochloromethane

1,1-Dichloroethane

1,2-Dichloroethane

1,1-Dichloroethylene

1,2-Dichloroethylene

1,2-Dichloropropane

cis-1,3-Dichloropropene

trans-1,3-Dichloropropene

**RESULTS**

90 ug/L

220 ug/Kg

<100 ug/L

190,000 ug/Kg

640 ug/L

<420 ug/Kg

<1,000 ug/L

Not analyzed

Not analyzed

< 100 ug/Kg

< 25 ug/Kg

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Sample no. 88-0187  
Date 4/01/88

**PARAMETERS**

Ethylbenzene  
2-Hexanone  
Methylene Chloride  
4-Methyl-2-Pentanone  
Styrene  
1,1,2,2-Tetrachloroethane  
Tetrachloroethylene  
1,1,1-Trichloroethane  
1,1,2-Trichloroethane  
Trichloroethylene  
Trichlorofluoromethane  
Toluene  
Total Xylenes  
Vinyl Acetate  
Vinyl Chloride

**RESULTS**

< 25 ug/Kg  
< 100 ug/Kg  
< 100 ug/Kg  
< 100 ug/Kg  
< 25 ug/Kg  
Not analyzed  
< 25 ug/Kg  
< 75 ug/Kg  
< 100 ug/Kg  
< 25 ug/Kg

**COMMENTS:** Analyzed by GC/MS at the Missouri Department of Natural Resources Laboratory.

Acenaphthene	< 250	ug/Kg
Acenaphthylene	< 250	ug/Kg
Aniline	< 250	ug/Kg
Anthracene	< 250	ug/Kg
Benzo(a)anthracene	< 250	ug/Kg
Benzo(a)pyrene	< 250	ug/Kg
Benzo(b)fluoranthene	< 250	ug/Kg
Benzo(ghi)perylene	< 250	ug/Kg
Benzoic acid	< 1000	ug/Kg
Benzo(k)fluoranthene	< 250	ug/Kg
Benzyl alcohol	< 250	ug/Kg
Bis(2-chloroethoxy)methane	< 250	ug/Kg
Bis(2-chloroethyl)ether	< 250	ug/Kg
Bis(2-chloroisopropyl)ether	< 250	ug/Kg
Bis(2-ethylhexyl)phthalate	< 250	ug/Kg
4-Bromophenyl phenyl ether	< 250	ug/Kg
Butyl benzyl phthalate	< 250	ug/Kg
4-Chloroaniline	< 250	ug/Kg
2-Chloronaphthalene	< 250	ug/Kg
4-Chlorophenyl phenyl ether	< 250	ug/Kg
Chrysene	< 250	ug/Kg
Dibenzo(a,h)anthracene	< 250	ug/Kg

**Page 4  
Sample no. 88-0187  
Date 4/01/88**

## **PARAMETERS**

## RESULTS

Dibenzofuran	<	250	ug/Kg
1,2-Dichlorobenzene	<	250	ug/Kg
1,3-Dichlorobenzene	<	250	ug/Kg
1,4-Dichlorobenzene	<	250	ug/Kg
3,3-Dichlorobenzidine	<	2500	ug/Kg
Diethylphthalate	<	250	ug/Kg
Dimethylphthalate	<	250	ug/Kg
Di-N-Butylphthalate	<	250	ug/Kg
2,4-Dinitrotoluene	<	250	ug/Kg
2,6-Dinitrotoluene	<	250	ug/Kg
Di-n-octyl phthalate	<	250	ug/Kg
Fluoranthene	<	250	ug/Kg
Fluorene	<	250	ug/Kg
Hexachlorobenzene	<	250	ug/Kg
Hexachlorobutadiene	<	250	ug/Kg
Hexachlorocyclopentadiene	<	500	ug/Kg
Hexachloroethane	<	250	ug/Kg
Indeno(1,2,3-cd)pyrene	<	250	ug/Kg
Isophorone	<	250	ug/Kg
2-Methylnaphthalene	<	250	ug/Kg
Naphthalene	<	250	ug/Kg
2-Nitroaniline	<	500	ug/Kg
3-Nitroaniline	<	500	ug/Kg
4-Nitroaniline	<	1000	ug/Kg
N-Nitrosodimethylamine	<	250	ug/Kg
N-Nitrosodi-n-propylamine	<	250	ug/Kg
N-Nitrosodiphenylamine	<	250	ug/Kg
Phenanthrene	<	250	ug/Kg
Pyrene	<	250	ug/Kg
1,2,4-Trichlorobenzene	<	250	ug/Kg

**COMMENTS:** Analyzed by GC/MS at the Missouri Department of Natural Resources Laboratory.

**LABORATORY SERVICES PROGRAM  
RESULT OF SAMPLE ANALYSIS**

**Sample No. 88-0200**

**Reported to: KEN TEETER  
Affiliation: EER**

**Date: 2/18/88  
Project Code: 3535/3000**

**Sample Description:  
LITTON INDUSTRIES  
FIELD BLANK FOR SAMPLE NOS: 88-0221, 88-0222 AND 88-0223**

**Collected by: KEN TEETER  
Affiliation: EER**

**Date: 01/27/88**

**PARAMETERS**

**RESULTS**

Acrolein	Not analyzed
Acrylonitrile	Not analyzed
Acetone	< 20 ug/L
Benzene	< 5.0 ug/L
Bromomethane	< 5.0 ug/L
Bromodichloromethane	< 5.0 ug/L
Bromoform	< 5.0 ug/L
2-Butanone	< 20 ug/L
Carbon Disulfide	< 5.0 ug/L
Carbon Tetrachloride	< 5.0 ug/L
Chlorobenzene	< 5.0 ug/L
Chloroethane	< 5.0 ug/L
2-Chloroethylvinyl ether	Not Analyzed
Chloroform	< 5.0 ug/L
Chloromethane	< 5.0 ug/L
Dibromochloromethane	< 5.0 ug/L
1,1-Dichloroethane	< 5.0 ug/L
1,2-Dichloroethane	< 5.0 ug/L
1,1-Dichloroethylene	< 5.0 ug/L
1,2-Dichloroethylene	< 5.0 ug/L
1,2-Dichloropropane	< 5.0 ug/L
cis-1,3-Dichloropropene	< 5.0 ug/L
trans-1,3-Dichloropropene	< 5.0 ug/L
Ethylbenzene	< 5.0 ug/L
2-Hexanone	< 20 ug/L
Methylene Chloride	< 20 ug/L
4-Methyl-2-Pentanone	< 20 ug/L

**Page 2**

**Sample no. 88-0200**

**Date 2/18/88**

**PARAMETERS**

Styrene  
1,1,2,2-Tetrachloroethane  
Tetrachloroethylene  
1,1,1-Trichloroethane  
1,1,2-Trichloroethane  
Trichloroethylene  
Trichlorofluoromethane  
Toluene  
Total Xylenes  
Vinyl Acetate  
Vinyl Chloride

**RESULTS**

< 5.0 ug/L  
Not analyzed  
< 5.0 ug/L  
< 15 ug/L  
< 20 ug/L  
< 5.0 ug/L

**COMMENTS:** Analyzed by GC/MS at the Missouri Department of Natural Resources Laboratory.